[preprint]aastex Hα Hβ He1 λ6678 [O3] λ5007 [O3] λ4959 [O3] λ4959+5007 [N2] λ6584 [N2] λ6548+6584 [S2] λ6717+6731 [S2] λ6717 [S2] λ6731 W(Hα) W(Hβ) W([O3] λ5007) W(WR λ4686) L(WR λ4686) L(Hβ) To appear in the Astronomical Journal MacKenty et al. 2000 HST/WFPC2 and VLA Observations of the Ionized Gas in NGC 4214 document *et al.*

HST/WFPC2 and VLA Observations of the Ionized Gas in the Dwarf Starburst Galaxy NGC 42141 The Ionized Gas in NGC 4214

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1Based on observations with the NASA/ESA Hubble Space Telescope and the NRAO Very Large Array. The HST observations were obtained at the Space Telescope Science Institute, which is operated by the Association of Universities for Research in Astronomy, Inc. under NASA contract No. NAS5-26555. The National Radio Astronomy Observatory is a facility of the National Science Foundation operated under cooperative agreement by Associated Universities, Inc.

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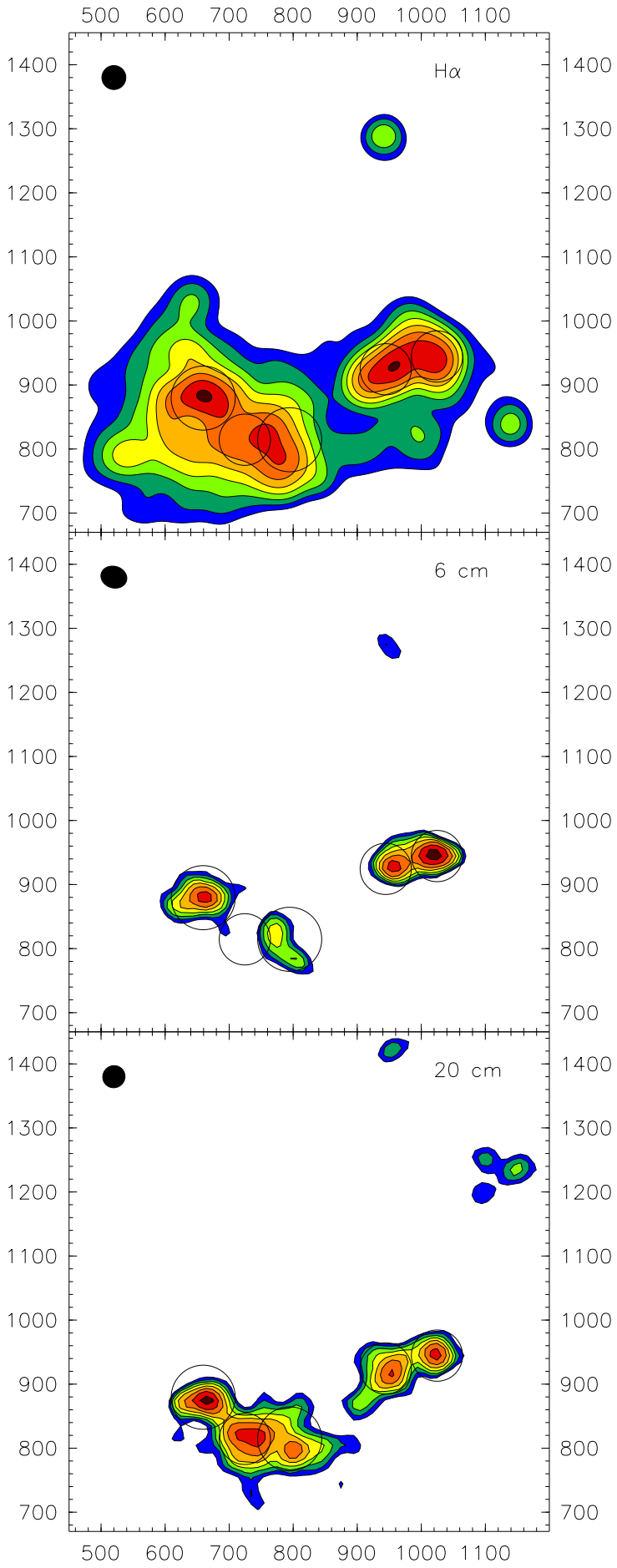
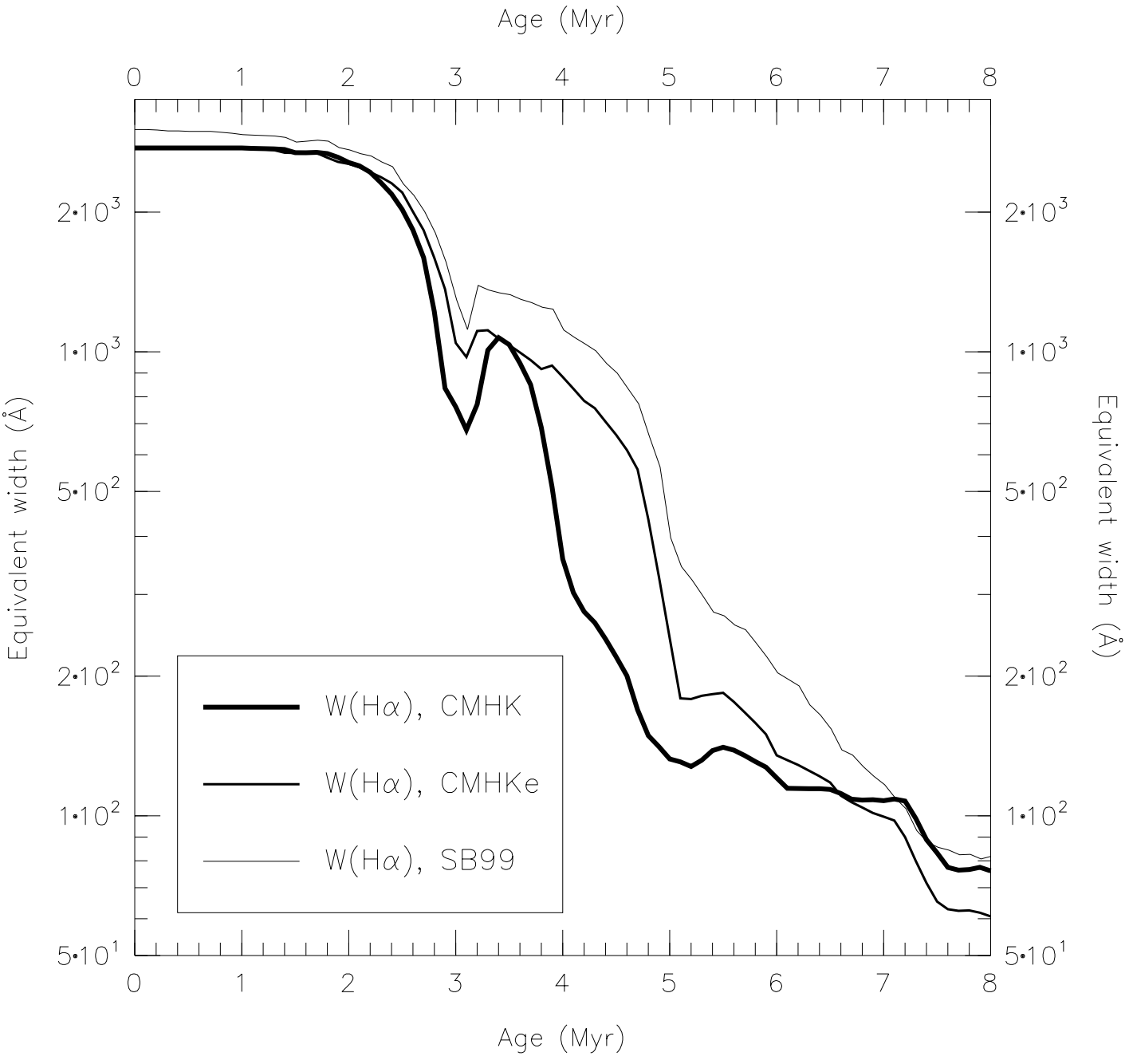
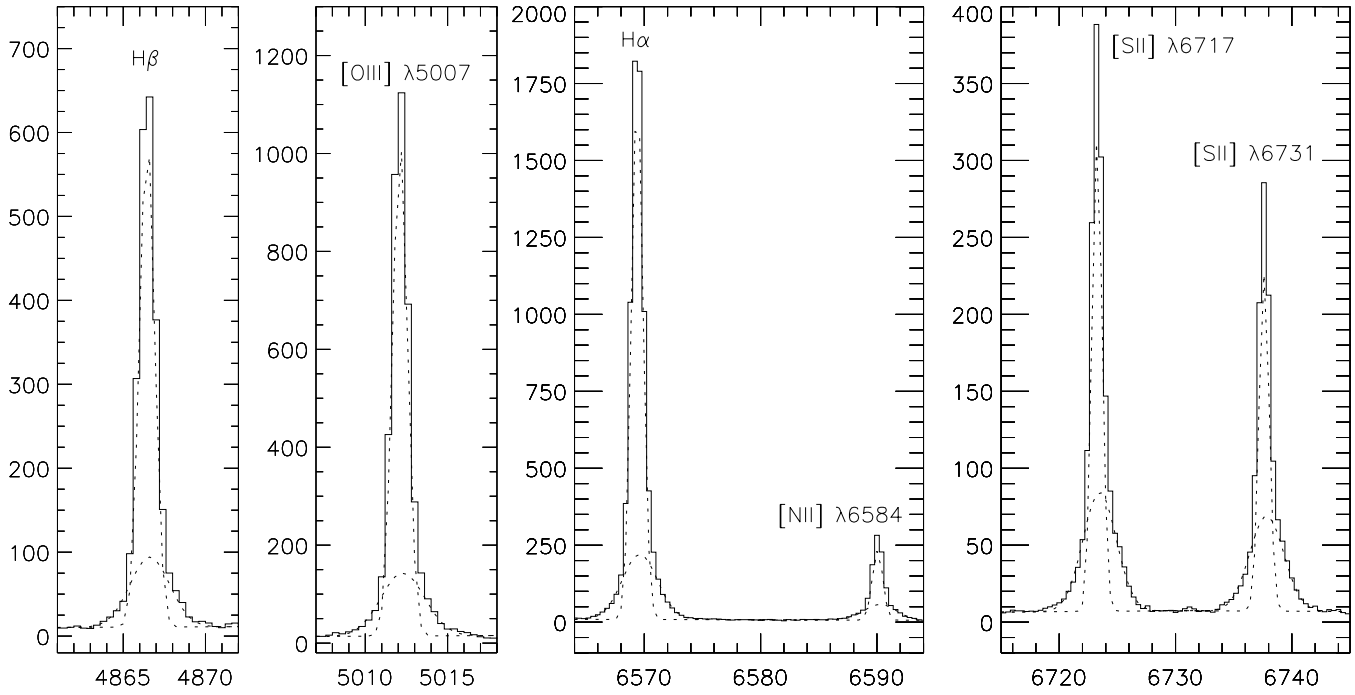
abstract

We present new and narrow band images of the starbursting dwarf galaxy NGC 4214, obtained with the Wide Field and Planetary Camera (WFPC2) onboard the Hubble Space Telescope (HST), together with VLA observations of the same galaxy. The HST images resolve features down to physical scales of $2-5$ pc, revealing several young (<10 Myr) star forming complexes of various ionized gas morphologies (compact knots, complete or fragmentary shells) and sizes ($\sim 10-200$ pc). Our results are consistent with a uniform set of evolutionary trends: The youngest, smaller, filled regions that presumably are those just emerging from dense star forming clouds, tend to be of high excitation and are highly obscured. Evolved, larger shell-like regions have lower excitation and are less extincted due of the action of stellar winds and supernovae. In at least one case we find evidence for induced star formation which has led to a two-stage starburst. Age estimates based on measurements do not agree with those inferred from wind-driven shell models of expanding H2 regions. The most likely explanation for this effect is the existence of an ≈ 2 Myr delay in the formation of superbubbles caused by the pressure exerted by the high density medium in which massive stars are born. We report the detection of a supernova remnant embedded in one of the two large H2 complexes of NGC 4214. The dust in NGC 4214 is not located in a foreground screen but is physically associated with the warm ionized gas.


Hα
6 cm
20 cm
500
600
700
800
900
1000
1100
700
800
900
1000
1100
1200
1300
1400


Age (Myr)
0
1
2
3
4
5
6
7
8
Equivalent width (Å)
2•10^3
1•10^3
5•10^2
2•10^2
1•10^2
5•10^1
W(Hα), CMHK
W(Hα), CMHKe
W(Hα), SB99


Hβ
[OIII] λ5007
Hα
[NII] λ6584
[SII] λ6717
[SII] λ6731
4865
4870
5010
5015
6570
6580
6590
6720
6730
6740